

# ECOLOGICAL IMPACT OF AFFORESTATION AT THE RANIBENNUR BLACKBUCK SANCTUARY

S. G. NEGINHAL<sup>1</sup>

(With two plates)

## INTRODUCTION

This paper deals with the ecological impact of afforestations on the populations of the Blackbuck *Antelope cervicapra*, the Great Indian Bustard *Choriotis nigriceps* and the Wolf *Canis lepus* at the Ranibennur Blackbuck Sanctuary of Karnataka State. These species had locally become almost extinct at Ranibennur on account of the destruction of their habitat and killings on a large scale, both by the villagers and poachers.

## METHODS

No systematic census was carried out. Rough estimates of the Blackbuck *Antelope cervicapra* and the Great Indian Bustard *Choriotis nigriceps* were arrived at through several visits taking counts, assisted by the Sanctuary officials. Information was also derived from the 'frequency of sighting'. I also had the opportunity of personal contacts with several forest officers who worked in this area since 1958.

## THE HABITAT

### Abiotic Conditions :

The Ranibennur Blackbuck Sanctuary covers an area of 119 km<sup>2</sup> of open and undulating scrub forests near Ranibennur of Dharwar District, Karnataka State. It has vast expanses of grasslands. The configuration is flat and

undulating, giving rise to gentle slopes and elevations (mounds) at places. The elevation ranges from 780 m to 985 m. The underlying rock chiefly consists of iron stone and quartz. The soil is very poor and lacks humus. It is shallow on the slopes and on the mounds and is eroded. The habitat is surrounded by agricultural fields where jowar, cotton, millets and oil crops are raised. The average annual precipitation is about 440 mm. The habitat receives both the south-west (June to August) and the north-east (September to November) monsoons, the latter contributing the major precipitation. The rainfall is, however, irregular and scanty. Drought and arid conditions generally prevail. All the streams cease flowing before the end of December and almost all water sources dry up in summer. The maximum temperature is around 38°C and the minimum around 20°C.

## BIOTIC CONDITIONS

### Flora :

From the abiotic conditions detailed above and the residual forests still occurring in the sanctuary it is evident that the ecosystem once supported a scrub type of forest at its climax. Kanitkar (1924) has recorded that the forests of Ranibennur were of scrub type which were already in poor and degraded conditions in 1924. So he had recommended replacing this silviculturally 'unsound and stunted growth' with a vigorous 'coppice and seedling growth'.

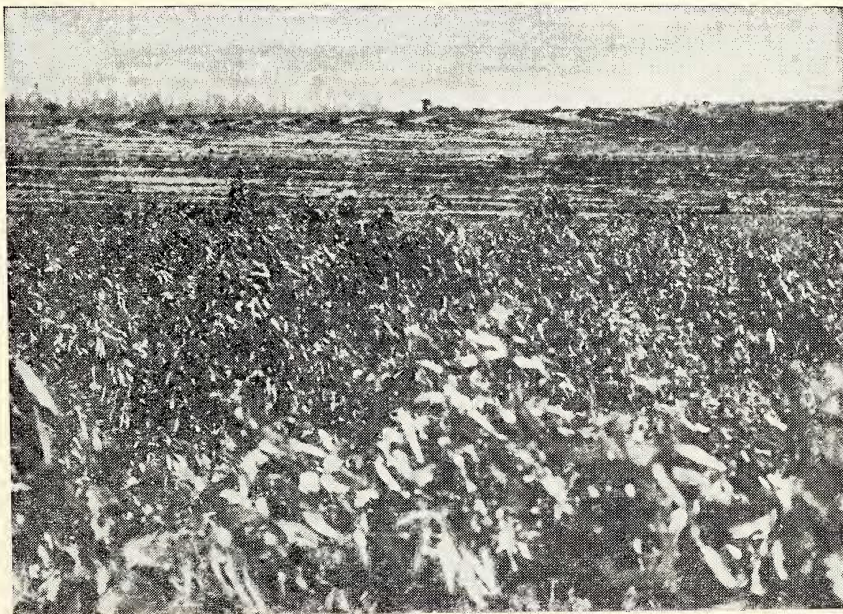
<sup>1</sup> Assistant Conservator of Forests (Wildlife), Mehboobnagar, Hubli-580 022 (Karnataka).



Neginhal : Ranibennur Blackbuck Sanctuary



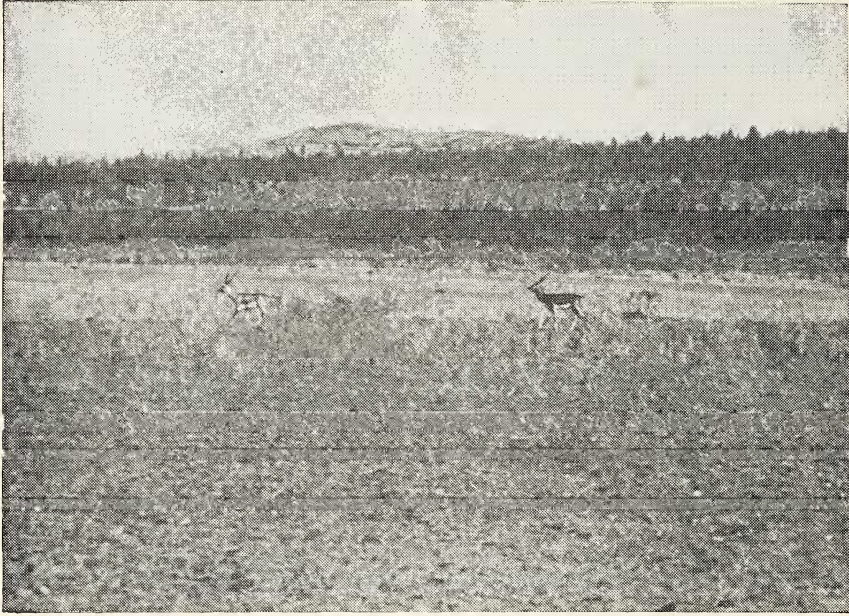
1. Afforested areas of Ranibennur, raised prior to 1972 by contour trenching, which provided sufficient open areas for blackbuck and bustard.



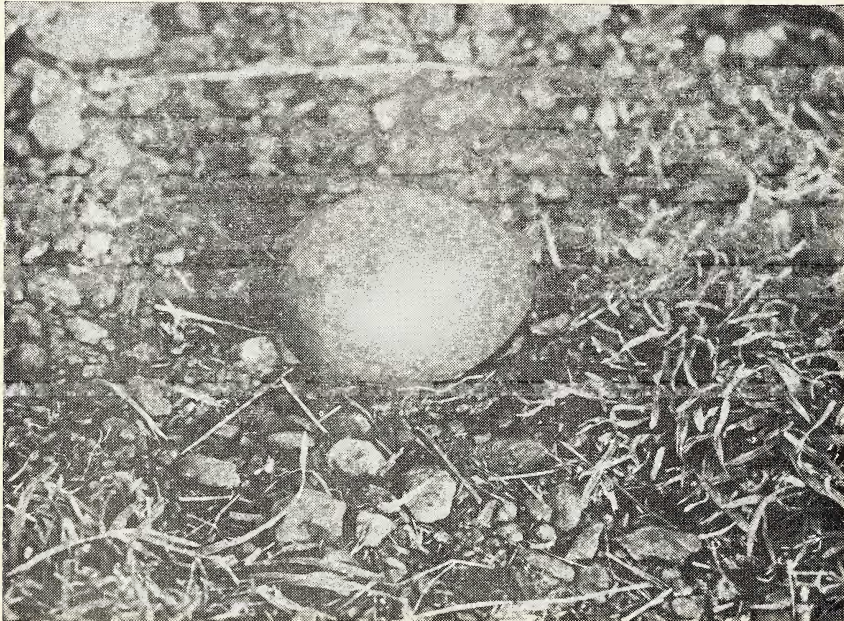
2. Mechanised afforestations from 1972 onwards created 'tall forests' of Eucalyptus and covered all open areas and even mounds, thereby discouraging blackbuck and bustard.



Neginhal : Ranibennur Blackbuck Sanctuary



3. The blackbuck spending their time in the adjoining open agricultural fields than in the intensively afforested areas.



4. A Great Indian Bustard's nest and its large egg found in the Sanctuary.



The forest growth, as described by Kanitkar, consisted of the species of *Albizia amara*, *Chloroxylon swietenia*, *Acacia* spp., *Hardwickia binata*, *Ixora parviflora*, *Euphorbia* spp., *Dodonaea viscosa*, *Carissa* spp., *Cassia auriculata*, *Lantana camara*, etc. Sandalwood *Santalum album* was found throughout the area. A fairly good growth of grass came up everywhere.

#### Wildlife :

No information on wildlife that existed in the area in 1924 is available. Kanitkar is silent about this rich inheritance. Local reports, however, confirm that the Ranibennur ecosystem supported in the past a varied and rich fauna such as the Blackbuck *Antelope cervicapra*, the Wild Boar *Sus scrofa*, the Wolf *Canis lupus*, and birds such as the Peafowl *Pavo cristatus*, and the Great Indian Bustard *Choriotis nigriceps*.

#### OBSERVATIONS

As prescribed by Kanitkar (1924), the scrub forests of Ranibennur were extracted and removed between 1924-1925 to 1954-1955. By 1958 the scrub forests were reduced to vast grasslands with scattered patchy growth of *Ixora parviflora*, *Euphorbia* spp., *Dodonaea viscosa*, and a few other scrub species. These degraded conditions were ushered in by the mounting influences of biotic factors of over-grazing, hacking and fires.

No wild animals were to be seen here in 1958. The blackbuck that reportedly moved in big herds in the past was not there. The great Indian bustard that had earned a local name as 'Yeraladdu', suggesting its local abundance, was not to be seen.

From 1958 to 1971 attempts were made by the Karnataka Forest Department to afforest these barren areas by contour trenching. These manually dug contour trenches were of the sizes of 0.91 m × 0.61 m × 0.45 m, 1.83 m ×

0.61 m × 0.45 m and 3.66 m × 0.45 m × 0.45 m and were staggered with a gap of 2 m in between two trenches and were vertically spaced at 9.15 m apart. Extensive denuded areas were also taken up for afforestation from 1970 onwards (Nadgouda 1977) to arrest soil erosion in the catchment areas of the Tungabhadra River of which Ranibennur formed a part.

In 1972 afforestation by manually dug trenches was replaced by mechanised afforestation. With the help of the heavy bulldozers, attached with specially designed rippers, the forest floor was ripped in lines at 2 m apart, instead of the spacing of 9.15 m apart earlier adopted during the manual trenching operations, and eucalyptus plants were planted 1.25 m and 1.5 m apart (Torvi 1975). Even the open space between the two rows of the previously afforested manually dug trenches was further ripped with the bulldozer and planted. More stress was also laid on planting eucalyptus hybrid, which soon grew to a height of 7-8 metres within 4-5 years. This mechanised afforestation from 1972 onwards went on drastically changing the entire structure and type of the habitat. The vast and expansive grassy blanks were covered by the fast growing eucalyptus hybrid over the years. So the open habitat of the blackbuck and the bustard went on shrinking; and they were forced to shift their resting and breeding grounds to other open areas, which would also be ripped later for planting. (On an average about 640 ha. of this area is covered annually under mechanised afforestations.)

Moreover the operations involved in the mechanised afforestations offered much disturbance to the wildlife. The noise of the bulldozer scared away the blackbuck and the bustards. On account of its capacity to plough any hard ground, most of the grazing grounds of the blackbuck and the nesting sites of the bustards were lost.

In 1976 I observed the blackbuck spending more of their time in the open harvested agricultural lands that adjoin the sanctuary than in the sanctuary itself. It was also an ecological warning that the sanctuary was slowly becoming unfit for their use due to the thick and tall vegetation replacing their open-ground and stunted vegetation.

Prior to taking up afforestations in 1958, the Ranibennur was in a degraded condition. The rich scrub forests and the fauna that it reportedly supported in the past were destroyed by man. Even the fertility of the soil had come down and erosion was taking place. The 'Soil conservation and afforestation' measures taken up from 1958 onwards recovered the situation and rejuvenated the habitat. As grazing was stopped in the afforested areas, fodder grass came up. Seeds of local species, brought from outside, were sown on the manually dug trench mounds. So the once eliminated local species started establishing in the forest. The exotic fast growing eucalyptus soon surpassed the local species in height and growth and thus established itself as the dominant species. The eucalyptus, however, did not pose any problems initially as it was planted far apart (9.15 m). But as the years passed the eucalyptus shot up and ecologically changed the scrub type of habitat, where the height of the forest was not more than 2 metres, into a different habitat with its vegetational growth of 7 to 8 metres.

The measures taken to afforest the area had initially a remarkable effect on the fauna. The blackbuck that was reduced to near extinction in the Ranibennur slowly started recovering. In 1958 when afforestations were taken up the blackbuck was not noticed in the area, although a few must have existed. As afforestations proceeded and years passed, reports started trickling in from the forest staff of sighting the black-

buck moving in the area in ones and twos; and this soon grew into small herds as the years passed. In 1970 and 1971 I observed the blackbuck roaming over this area in large herds, congregating on the grassy plains and barren mounds which were not covered by afforestation (Neginhal 1974). In 1970 I had estimated the population of blackbuck to be about 600 by visual counts. In September 1971 this habitat was constituted as a blackbuck sanctuary (based on my report), covering an area of 119 km<sup>2</sup>. In my 1974 visit the population of blackbuck was still on the increase and my visual count put the population around 1000.

This spurt in the population of the blackbuck was not a healthy sign in the absence of a predator, and I was wondering how nature would respond to this requirement. Nature soon met this situation by bringing in a predator. In 1973 a wolf was reported in the sanctuary and 2 years later a wolf was sighted with cubs (Krishnan 1975).

In 1971 the Great Indian Bustard, an endangered species, was sighted in the sanctuary authentically for the first time. These birds soon started breeding here. In 1974 I counted 15 birds and in May 1976 I saw and photographed a nest with an egg (Neginhal 1976). The other important birds seen were the Common Sandgrouse *Pterocles exustus*, the Indian Courser *Cursorius coromandelicus*, the peafowl and the Pale Harrier *Circus macrourus*.

The intensive work of afforestations has also affected the indigenous flora, so typical of the open scrub forests of the Deccan. The *Acacia* spp., *Euphorbia* spp., *Ixora parviflora* and other indigenous floral patches where the bustard used to shelter have disappeared now.

The eucalyptus hybrid, a variety selected initially in 1958 for its fast growing and hardy nature, later found to be of industrial use in the



manufacture of rayon and paper pulp, posed a further danger to the habitat owing to the disturbance caused while cutting and transporting the wood.

#### DISCUSSIONS AND CONCLUSIONS

The blackbuck, the wolf, the fox and the Great Indian bustard were not reported in the Ranibennur habitat in 1958, when the afforestations were started. Afforestations were taken up from 1958 to 1972 with wide spaced manually dug trenches. The blackbuck rose to a population of 600 in 1970 and to 1000 in 1974. The wolf was spotted in 1973. The Great Indian bustard was first sighted in 1971 and rose to a population of 15 in 1974 and remained almost constant in 1976.

Prior to carrying out afforestations, the blackbuck population must have been reduced to imperceptible proportions due to adverse biotic factors to which the habitat was subjected, such as heavy grazing, hacking, fires and poaching. The afforestation work increased the carrying capacity of the habitat. It gave indirect protection against the poachers on account of the constant presence of the forest staff engaged in afforestation-cum-soil conservation works. As the grazing was restricted and was closed in the afforested parts, grass came up profusely and provided ample food to the blackbuck. This was supplemented by the indigenous vegetation that came up on account of the stoppage of grazing. The grass and other vegetation also offered the much needed shelter and cover. So the adverse factors decreased as the welfare factors increased in proportion. This gave a boost to the natality rate while the mortality was far reduced. On account of these favourable conditions the population of blackbuck kept increasing rapidly.

As the population of blackbuck increased along with an increase in the small mammals

and birds, favourable conditions were set for sustaining a predator; and this came in the form of the wolf.

The afforestations work also created congenial environmental conditions for the Great Indian bustard. However, the intensification of afforestations by mechanised means started closing what-ever open areas were available with tall growth of fast growing vegetation and this poses a great threat to the blackbuck and the bustard. With the help of heavy bulldozers the remaining open grassy patches, used for roaming and breeding by the blackbuck and the bustard, were ripped and planted intensively within no time. The afforestations with exotics also endangered the local flora.

The blackbuck and the bustard are evolved for open habitat and hence they thrive best in open plains scattered with scrub growth. Sálím Ali (1969) refers to the Great Indian bustard as a species affecting wide open spaces of scanty grassland interspersed with scrub. Prater (1948), Schaller (1967) and Krishnan (1972) gave the habitat of the blackbuck in open forests and open meadows. The wolf too prefers open scrub areas. In the initial years of afforestations from 1958 onwards the general conditions and characters of the 'scrub and grass' continued to prevail in the environment. The initial low height of the plants, especially of eucalyptus, did not pose any ecological problems to these animal and bird species. But soon the habitat changed. The stunted condition of the 'scrub forests' changed to a tall 'forest growth' on account of the fast growing eucalyptus which reached a height of about 8 metres within about 4-5 years. This 'tall forest' started covering the existing bare areas, year by year, on account of the progressive afforestation works, thereby shrinking the habitat of the blackbuck, the bustard and the wolf. The habitat is becoming unsuitable for the existence of these species.

In course of time the habitat may even

replace the blackbuck with the Spotted Deer *Axis axis*, the wolf with the Leopard *Panthera pardus*, the great Indian bustard with the Grey Junglefowl *Gallus sonneratii*, the Indian courser with the lapwings (*Vanellus malabaricus* and *V. indicus*). Should we desire this ecological succession which would eliminate the endangered blackbuck, the great Indian bustard and the wolf that Nature has attempted to rehabilitate in this ecosystem in the question.

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*Note*: In 1979 I again visited this sanctuary and could trace only one bustard as against 15 spotted in 1974. Most of the Blackbuck were found in the surrounding agricultural fields than in the sanctuary. A leopard was also reported prowling in the sanctuary.